REMARKS

The Preliminary Amendment and claims 1-6

The applicants filed a preliminary amendment with the original application papers. The office action made no mention of the preliminary amendment and the applicants believe it may have been overlooked. A copy of it is enclosed with this response.

The preliminary amendment amended the specification to add the claim of priority to the parent application. This amendment should be entered.

The preliminary amendment also cancelled claims 1-6. The Office Action indicated claims 1-6 were pending and made no mention of the preliminary amendment. Applicants wish to have claims 1-6 re-entered into the application. The claim listing above lists them as "original", which is believed to be the correct nomenclature in this situation.

Claims 7 and 10 were amended in the Preliminary Amendment and so the claim listing above recites them in their amended form as "previously presented."

Double Patenting

The Examiner rejected claims 1-4 and 6 as obvious type double patenting over the patent issued from the parent application, Dynarski et al. US 6,272,129.

A terminal disclaimer is submitted herewith to overcome the double patenting rejection. A check for payment of the disclaimer fee is also enclosed.

Obviousness Rejection of claims 7-9

The Examiner rejected claim 7-9 as unpatentable over Yuan (6296,704) in view of Penners (5,793,726). The applicants traverse the rejection.

Briefly, by way of review, the present invention provides for a method by which a terminal on an IP network may initiate communication with a mobile node, where knowledge of the whereabouts and connectivity of the mobile node is not known in advance. A wireless networking service implementing this concept can be thought of as a "push" service, in that the terminal on the network "pushes" data to the mobile node.

In the prior art, the mobile device typically must dial into the IP network through a network access server in order to gain access to the IP network and communicate with a terminal on the network. If a terminal on the network were to attempt to initiate communication with the mobile terminal on its own, the terminal on the network and/or other communications elements in the IP network or wireless network would have to know several things: where the mobile terminal is located, whether it was within range of the wireless network, whether it was ready to receive the data (i.e., booted up), and possibly still other pieces of information, such as the information uniquely identifying the device in the wireless network such as its International Mobile Subscriber Identity (IMSI) number and/or its Electronic Serial Number (ESN). Obviously, this circumstance makes it quite cumbersome, if not impossible, heretofore, for a terminal on the IP network to initiate communication with the wireless device. For example, if a home agent for the mobile device receives an incoming IP packet for the device but does not have a record of where the device is located (e.g., a mobility binding record indicating where to send the packets received from the terminal), it would simply drop the packets.

The present invention attempts to overcome these problems and provide a simple, efficient and automatic way of permitting the terminal on the IP network to initiate communication with the mobile wireless communications device. More specifically, the invention uses the paging ability of the wireless network to locate the wireless mobile communications device whenever a terminal on the IP network attempts to send a packet whose IP destination address matches that of the mobile device. Once the mobile device has been paged the mobile node device automatically becomes connected to the IP network and is able to communicate with the remote terminal.

As set forth in the summary of the invention of the instant application, the present claims are directed to a method for automatically locating and connecting a mobile wireless communications device ("device") to an IP network. The method comprises the steps of receiving an Internet Protocol (IP) packet from a terminal on the network and destined for the device. The IP packet is received at a home agent for the device, which may be a router on the IP network which acts as mechanism for coordinating the receipt and transmission of communication sessions for the device in conjunction with other telecommunications equipment, described in more detail below. In a preferred embodiment, the home agent comprises a router that is coupled to a local area network (LAN) on which resides an authentication server, one or more InterWorking Units (network access servers coupling the wireless network to the local area network and IP network) and a Signaling System 7 network agent coupling the local area network to a Signaling System 7 network.

The home agent then transmits an Access-Request message to the authentication server for authentication. An example of such an authentication server is a RADIUS

server (a known device) providing accounting, authorization and authentication functions for a plurality of mobile users. The Access-Request message includes a destination IP address for the wireless device that was included in the IP packet from the terminal on the network.

The authentication server responsively issues an Access-Accept message to the home agent if the device is authorized to receive the IP packet, in other words, if the user operating the device has paid its bills, is a subscriber to the service, etc. The Access-Accept message includes two pieces of data: (a) information uniquely identifying the device that is being "called" by the remote terminal, such as the IMSI/ESN number of the device, and (b) information identifying a particular network to use to locate the device, such as the local area network or the Signaling System 7 network.

In the event that a local area network is specified, the home agent transmits a message, such as an Address Resolution Protocol (ARP) packet containing the IMSI/ESN number or other information uniquely identifying the device, on the designated network to a mobile node location server. In a preferred embodiment, one of the network access servers on the LAN is configured to be the mobile node location server. The mobile node location server maintains a table mapping current IP addresses for a plurality of mobile communication devices to the information uniquely identifying the devices. In the event that the IMSI/ESN number for the device is not found by the mobile node location server in the table, indicating that the device is not currently registered with or communicating with the IP network and has no current, valid IP routing address, the mobile node location server responsively initiates a page of the device via the wireless communications network.

When the device receives the page, it then knows that a terminal on the IP network is trying to reach it. When the device responds to the page, a connection through the communications network and the packet-switched network is initiated. The connection will go through one of the other network access servers on the LAN (which could also be the network access server acting as the mobile node location server). The network access server receiving the incoming call from the wireless device notifies the mobile node location server that it has the call (e.g., by an ARP message) providing it with the IP address for the mobile node, and this information is placed in the mapping table maintained by the mobile node location server. The new IP address is forwarded to the home agent to enable the packet from the remote terminal to be routed to the network access server. At this point the communication between the device and the terminal on the network may be accomplished and the IP packet is sent to the mobile device.

Claims 7-9 are directed the situation in which the authentication server specifies to the home agent that a Signaling System 7 network is to be used to locate the mobile device. The process proceeds in an analogous fashion. The home agent transmits a query message to a home location register node through the Signaling System 7 network. Basically, the query seeks registration, location and routing information for the mobile device. The home location register node replies to the home agent with location information for the device, such as the mobile device's temporary local directory number. At this point, the home agent sends a call set-up message to a destination mobile switching center in the wireless network using the mobile device's location information to trigger a page of the device.

When the device responds to the page, and connection between the device and the wireless network is initiated and the device is connected to one of the network access servers coupled to the home agent over the LAN. The mobile device thus initiates a connection between the device and the packet-switched network whereby the IP packet may be transmitted to the device and communication between the mobile device and the remote terminal may proceed.

The above inventive features are concisely captured in claim 7:

> 7. A method of automatically locating and connecting a wireless communications device to an Internet Protocol (IP) network, comprising the steps of:
>
> receiving an IP packet from a terminal on said network at a home agent;
>
> said home agent transmitting an access-request message to an authentication server, said access-request message comprising a destination IP address found in said IP packet;
>
> said authentication server responsively issuing an access-accept message to said home agent if said device is authorized to receive said IP packet, said access-accept message comprising information uniquely identifying said device;
>
> said home agent transmitting a query message to a home location register node on a Signaling System 7 network, said home location register node responsively replying to said home agent with location information for said device;
>
> paging said device via a wireless communications network; and
>
> in response to said page, said device initiating a connection via said wireless communications network to said IP network whereby said IP packet is transmitted to said device.

The applicants submit that the invention of claim 7 is not at all obvious over the combination of Yuan and Penners and request withdrawal of the rejection. The primary reasons are:

(1) Yuan and Penners are not directed to a situation of "pushing" data to a wireless communications device, but rather assume that the device is already in a connected state; and

(2) Neither Yuan nor Penner disclose a step of paging the device, in combination with location information received from a home location register on a Signaling System 7 network.

Yuan is directed to a system which is designed to allow a mobile station to communicate with a host on a network using either of two mutually incompatible networking schemes—mobile IP networking and Cellular Digital Packet Data (CDPD) networking. See Col. 9 lines 15 et seq. The entire discussion of Yuan *assumes* that the mobile device 116 is connected to the networks 112 and 114 and the reference is silent on how to initiate a push of data from the host 130 in the situation where the mobile device is not currently registered with a MDIS (mobile data intermediate system) 126.

The Examiner cites to Yuan at col. 10 lines 48-62 for a teaching of a paging of the mobile device. That is not correct. At this portion of the reference, Yuan is merely describing the function of the MDIS to forward encapsulated data packets to the mobile unit 116 and the mobile unit 116 decapsulates the data packets. This is NOT a teaching of a paging of the device. Obviously, the process described at col. 10 assumes that a logical connection between the base station 124 and the mobile unit 116 is already established. The passage makes no mention of a paging of the mobile unit. This is clear from the passage at col. 11 lines 1-30, describing the prior registration process that occurs in order to have packets forwarded to the mobile unit.

Note further that Yuan, at col. 12 lines 44 et seq., describes a process whereby the mobile unit 116 migrates into a CPDP network. Again, the Mobile device broadcasts an "end system hello" message to notify the MDIS that it has entered the area. The MDIS 178 registers with the home MDIS. This process triggers a redirection request process

that directs the home MDIS to forward data packets to the new MDIS 178. A confirmation process occurs. There is no discussion of (and no need for) any paging process as the mobile device transitions between CDPD and Mobile IP networks. Yuan does not solve the problem of initial push of data from the host 130 (Figure 6) to the mobile device where the registration and connection processes disclosed in Yuan have not already been established.

The Examiner cites to Penners for a teaching of a home location register node, the node replying to a home agent with location information, and a signaling system 7 network.

It is evident from Penners et al. that the central problem of providing a "push" service, by which a terminal on an IP network may initiate an IP data networking session with a mobile node is not satisfactorily addressed, particularly when the current location of the mobile node is not known, let alone in the manner claimed in claim 7. Figures 7 and 8 of Penners et al. and the text at column 9 line 41 recite how the mobile node may initiate registration with a foreign agent. Figure 9 describes packet delivery from a correspondent host 148 to the mobile host 134. If the mobile node is away from its home network, and if the mobile node has a foreign agent destination, then the home agent intercepts the packets and forwards them to the foreign agent for forwarding to the mobile node. The discussion at the text bridging columns 9 and 10 assumes that the mobile node has a foreign agent care-of destination. Penners does not deal with the situation in which the mobile node has no known current foreign agent care of destination.

Penners also does not disclose a step of paging a device as claimed in claim 7.

Accordingly, applicants submit that the proposed combination of Yuan and Penners does not render claim 7 obvious. The rejection of claims 7-9 should be withdrawn.

Allowance of claims 5 and 10

The Examiner indicated that claim 5 would be allowed if rewritten into independent form. Such action has been taken. Claim 10 was indicated as allowable. Thus, claims 5 and 10 should be allowed.

Supplemental information disclosure statement

The applicants have submitted a supplemental information disclosure statement to bring to the Examiner's attention the office action from the parent application rejecting claims 1-4 and 6 and the applicants' response to that office action. Such information may be material to the examination of this application in light of the presentation of the same claims in this application.

Favorable consideration of the application and allowance of the claims is requested.

Respectfully submitted,

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Date: March 15, 2005 By: Thomas A. Fairhall

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CERTIFICATE OF MAILING

The undersigned hereby certifies that the foregoing AMENDMENT A is being deposited as first class mail, postage prepaid, in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, PO Box 1450 Alexandria VA 22313-1450 on this 15th day of March, 2005.

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